

REMARKS

Reconsideration and allowance in view of the following remarks are respectfully requested.

Claims 1-16 are pending in the application. Claims 1, 6, 7, 8 and 9 are amended.

Claim 5 is canceled without prejudice or disclaimer. Claims 10-16 are added.

The disclosure was objected to because of informalities, which were noted in the Office Action. Applicants have amended the specification in accordance with the guidance provided by the Examiner. Accordingly, reconsideration and withdrawal of the objection to the specification are respectfully requested.

The Office Action states on page 2, paragraph 2, that the listing of references in the specification is not a proper information disclosure statement because under MPEP § 609A(1) the list of all patents, publications, or other information submitted for consideration by the Office, “may not be incorporated into the specification but must be submitted in a separate paper.” Applicants submitted that the references are in the nature of background information. Nonetheless, in an abundance of caution, Applicants have enclosed in this amendment an Information Disclosure Statement and Form 1449 including the references listed in the specification. Accordingly, the Examiner is respectfully requested to initial each reference and sign and date PTO Form 1449 and return it to Applicant’s representative with the next Office Action.

Claim 9 was objected to under 37 C.F.R. § 1.75(c). Applicants have rewritten claim 9 in independent form, in accordance with the guidance provided by the Examiner. In addition, claim 9 has been amended to positively recite that the device manufactured is a semiconductor device. Applicants respectfully submit that the amendments to claim 9 overcome the objection. Accordingly, reconsideration and withdrawal of the objection under 37 C.F.R. § 1.75(c) are respectfully requested.

Claims 1-9 were rejected under 35 U.S.C. § 102(e) over Del Puerto (U.S. Patent No. 6,369,874). Applicants respectfully submit that the amendments to claims 1 and 8 overcome the rejection.

Claim 5 has been canceled without prejudice or disclaimer, thus rendering moot the rejection of claim 5.

Claim 1 is amended to recite that a space containing at least part of said projection system is at a pressure of about 0.1 to 10 Pa and contains argon, nitrogen, helium or a mixture thereof.

On the other hand, Del Puerto discloses a lithography system having three chambers 104, 106 and 108 separated by partitions 109. Pressure zone 104 houses the optics of lithography system 100. In this system, “the atmosphere of pressure zone 104 comprises hydrogen gas supplied by photoresist outgassing.” (Col. 5, lines 45-46) However, Del Puerto does not disclose a pressure zone 104 containing argon, nitrogen, helium or a mixture thereof.

Accordingly, Applicants respectfully request the rejection of claim 1 under 35 U.S.C. § 102(e) over Del Puerto be withdrawn.

Claim 8, as amended, discloses a method of manufacturing a device using a lithographic projection apparatus comprising, among other things, supplying a continuous flow of argon, nitrogen, helium or a mixture thereof to a space containing at least a part of said projection system, wherein the pressure in said space is from 0.1 to 10 Pa.

As mentioned previously, Del Puerto discloses a lithography system having three chambers 104, 106 and 108 separated by partitions 109. Pressure zone 104 houses the optics of lithography system 100. In this system, “the atmosphere of pressure zone 104 comprises hydrogen gas supplied by photoresist outgassing.” (Col. 5, lines 45-46) However, Del Puerto does not teach or suggest a pressure zone 104 containing argon, nitrogen, helium or a mixture thereof. In addition, it is respectfully submitted that Del Puerto does not disclose a system

wherein a flow of argon, nitrogen, helium or a mixture thereof is continuously supplied to a space containing at least a part of said projection system. Therefore, Applicants respectfully request that the rejection of claim 9 under 35 U.S.C. § 102(e) over Del Puerto be withdrawn.

Claims 2, 3, 4, 6 and 7 depend from claim 1 and are patentable for at least the same reasons discussed above and for the additional features recited therein. Claim 9 depends from claim 8 and is patentable for at least the same reasons given above related to claim 8 and for the additional features recited therein.

Accordingly, reconsideration and withdrawal of the rejection of claims 2, 3, 4, 6, 7 and 9 under 35 U.S.C. § 102(e) over Del Puerto are respectfully requested.

Claims 10-16 are newly added. Applicants respectfully submit that these claims are supported by the specification. Claims 10-16 depend from allowable claim 1 and are patentable for at least the same reasons given above related to claim 1. Furthermore, with respect to claims 11, 14 and their respective dependent claims, Applicants respectfully submit that Del Puerto fails to teach or suggest an apparatus wherein the space containing at least part of the projection system or a space containing at least part of said illumination system is supplied with a continuous flow of argon, nitrogen, helium or a mixture thereof.

Accordingly, Applicants respectfully submit that claims 10-16 are allowable.

Attached hereto is a marked-up version of the changes made to the specification and to claims 1, 6, 7, 8, and 9 by the current amendment. The attached Appendix is captioned **“Version with markings to show changes made.”**

Applicants have addressed all of the Examiner's rejections and respectfully submits that the application is in condition for allowance. A notice to that effect is earnestly solicited.

Respectfully submitted,  
PILLSBURY WINTHROP, LLP

By: 

Robert C. Perez  
Reg. No.: 39,328  
Tel. No.: (703) 905-2159  
Fax No.: (703) 905-2500

JSB/RCP/CFL  
1600 Tysons Boulevard  
McLean, VA 22102  
(703) 905-2000

Enclosures: **Appendix**  
**Information Disclosure Statement**  
**PTO Form 1449**

**APPENDIX**

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION:**

Page 8, please delete the full paragraph beginning on line 10 and replace it with the following paragraph:

The introduction of a low pressure of an inert gas into the chambers 2 and 7 has the effect of decreasing the mean free path of any contaminant particles such as hydrocarbon molecules or water vapor which are present in the chamber. In a chamber evacuated to a pressure of  $10^{-1}$  Pa or less, the mean free path of such particles is larger than the typical dimension of such chamber. The flux of the particles towards an optical component, such as a mirror, in the chamber is therefore determined by direct molecular bombardment of the component's surface. The molecule flux can be calculated using the following equation:

$$\text{Molecular flux} = n_{CH_x} v / 4$$

Where  $n_{CH_x}$  is the contaminant concentration (largely made up of hydrocarbons, but it [ma] may also be water, for example) and [□]  $v$  is the mean velocity of the contaminant particles.

Page 8, please delete the full paragraph beginning on line 20 and replace it with the following paragraph:

By introducing an inert gas into the chamber at a pressure of 0.1 to 10 Pa, the mean free path of the contaminant particles is decreased and the flux of the particles towards the optical component is now determined by diffusion. The diffusion flux can be calculated as follows:

$$\text{Diffusion flux} = D n_{CH_x} / l$$

where  $D$ , the diffusion coefficient, is determined by  $D = kT\nu / 3\sigma p$ ,  $l$  is the characteristic size of the vacuum chamber,  $[\Phi] \sigma$  is the diffusion cross section,  $p$  is the background pressure in the chamber and  $k$  is the Boltzmann's constant.  $[\Phi] \sigma$  can be calculated using a known diffusion coefficient for Ar-CH<sub>X</sub> mixtures at a given  $T$  and  $p$ .  $[\square] \nu$ , the mean velocity of the molecules in the mixture can in this case be calculated using:

$$D = \sqrt{8kT / \pi M}$$

Where  $M$  is the mass of a molecule in the mixture.

IN THE CLAIMS:

Claim 5 is cancelled.

Claims 1, 6, 7, 8 and 9 are amended as follows:

1. (Amended) A lithographic projection apparatus comprising:
  - a radiation system to supply a projection beam of radiation;
  - a support structure to support patterning structure, the patterning structure serving to pattern the projection beam according to a desired pattern;
  - a substrate table to hold a substrate; and
  - a projection system to project the patterned beam onto a target of the substrate, wherein [at least one space selected from the group comprising a space containing at least part of said radiation system, and] a space containing at least part of said projection system [contains an inert gas] is at a pressure of about 0.1 to 10 Pa and contains argon, nitrogen, helium or a mixture thereof.

6. (Amended) An apparatus according to claim 1, wherein the pressure in said [at least one] space is from 1 to 5 Pa.

7. (Amended) An apparatus according to claim 6, wherein the pressure in said [at least one] space is from 2 to 3 Pa.

8. (Amended) A method of manufacturing a device using a lithographic projection apparatus comprising:

projecting a patterned beam of radiation onto a target portion of a layer of radiation-sensitive material on a substrate; and  
supplying [an inert gas] a continuous flow of argon, nitrogen, helium or a mixture thereof to [at least one space selected from the group comprising a space containing at least a part of said radiation system and] a space containing at least a part of said projection system, wherein the pressure in said [at least one] space is from 0.1 to 10 Pa.

9. (Amended) A semiconductor device manufactured in accordance with [the method of claim 8] a method comprising:

projecting a patterned beam of radiation onto a target portion of radiation-sensitive material on a substrate; and  
supplying a continuous flow of argon, nitrogen, helium or a mixture thereof to a space containing at least a part of said projection system, wherein the pressure in said space is from 0.1 to 10 Pa.

Claims 10-16 are newly added.

End of Appendix.